A COMPARATIVE STUDY BETWEEN ULTRASOUND WITH ANTERIOR GLIDE VERSUS POSTERIOR GLIDE JOINT MOBILISATION TECHNIQUE ON SHOULDER EXTERNAL ROTATION ROM IN PATIENTS WITH ADHESIVE CAPSULITIS

A Dissertation Submitted In Partial Fulfillment

of the Requirements for the Degree of

MASTER OF PHYSIOTHERAPY

With Specialization In

ADVANCED PHYSIOTHERAPY IN ORTHOPAEDICS

Register Number: 27091403

Submitted to

THE TAMILNADU DR. M.G.R MEDICAL UNIVERSITY
Chennai

JKK MUNIRAJAH MEDICAL RESEARCH FOUNDATION

COLLEGE OF PHYSIOTHERAPY

Department Of Post Graduate Studies

Komarapalayam - 638 183

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ACKNOWLEDGEMENT

"Nothing will work unless u do"

The investigator expresses his whole hearted gratitude to **THE LORD ALMIGHTY** who has given countless opportunities and parents and friends who laid the foundation for knowledge and wisdom.

The investigator extends sincere thanks to **Dr. J.K.K. Munirajahh, M.Tech.,** (Bolton), Managing Director, JKKMMRF College of Physiotherapy for providing all necessary infrastructure for an excellent P.G. Programme.

The investigator expresses deep concern and gratitude to **Mr. D. Kannan, M.P.T., (Neuro) MIAP,** Principal, JKKMMRF College of Physiotherapy for his valuable suggestion, guidance and support.

The investigator acknowledges with all gratitude and deep indebtedness for the guidance and encouragement provided by, **Mrs. J. Jeslin Jeba Sheela, M.P.T., (Ortho),** professor JKKMMRF College of Physiotherapy.

The investigator expresses much gratitude to **Mr.R.Ferdinand, M.P.T. (Ortho), Mr. John Vinothraj, M.P.T.,(Neuro**), **Mr.A. Saravanan M.P.T.,(Cardio), Mr.A.Ayyappan, M.P.T.,(Neuro), Miss.R.Vishnupriya M.P.T.,(Neuro), Mrs.V.Kokila M.P.T.,(Ortho)** for their valuable guidance.

The investigator also has much gratitude to **Mr. K. Dhanapal, M.Sc.,** JKKMMRF College of Physiotherapy, statistician for his unrelenting devotion and determination for statistical excellence.

The investigator is also indebted to his friends for their support and criticism during the work of this dissertation.

The investigator extends her sincere thanks to subjects who took part in the study.

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INTRODUCTION

Shoulder joint is one of the most functional and rewarding joint necessary for normal daily activities, occupational performance and recreational activities. Its function comprises between stability and mobility, which are mutually co-existent. It forms the base of all upper limb activities, which are skilled and powerful activities. The combined mechanics of its joints and muscles provide for and control the mobility.

Duplay in 1872 was first describing the painful stiff shoulder referring as humeroscapular periarthritis. Codman in 1934 coined the name Frozen shoulder attributing the painful stiff shoulder to a short rotator tendonitis. Neviaser in 1945 gave the name Adhesive capsulitis.

Pain in the shoulder and shoulder girdle is very common in the general population. Approximately 7% to 21% of the population suffers from painful or stiff shoulder. A report prevalence that of 15% to 25% in patients with 40-50 years of age having shoulder pain. In industry the prevalence of symptoms and disorders from shoulder region is 30% to 40% and has increased six times during last decade.

Primary adhesive capsulitis affects from 2% to 3% of the general population and is the main cause of shoulder pain and dysfunction. It is related to age, menopause, hand dominance, nature of onset, duration of symptoms or associated medical conditions.

The range of motion (ROM) impairments associated with primary adhesive capsulitis can impact a patient's ability to participate in self care and occupational activities. Even though this condition is considered self-limiting with most patients having spontaneous resolution within 3 years. Secondary adhesive capsulitis is associated with a known predisposing condition of the shoulder e.g, humerus fracture, shoulder dislocation, avascular necrosis, osteoarthritis or stroke.

The adhesive capsulitis is caused by the inflammation of the joint capsule and synovium that eventually results in the formation of capsular contractures. The capsule does not become adhered to the humerus but the contracted capsule holds the humeral head tightly against the glenoid fossa. Clinically there is global loss of both passive and the active ROM of the glenohumeral joint, with external rotation usually being the most restricted physiologic movement.

Rehabilitation program consisting of Exercise, Massage, and Modalities have been shown to improve shoulder ROM in all planes except external and internal rotation.

The main purpose of this study is to determine the effectiveness of ultrasound with anterior glide Vs posterior glide joint mobilization in regards to improve the shoulder external rotation ROM in patients with adhesive capsulitis.

AIMS AND OBJECTIVES

AIM OF THE STUDY

To compare the effect of ultrasound with anterior glide versus ultrasound with posterior glide joint mobilization technique on shoulder external rotation range of motion in the patients with adhesive capsulitis.

OBJECTIVES OF THE STUDY

- To determine the effectiveness of ultrasound with anterior glide mobilization technique to increase the shoulder external rotation range of motion in the patients with adhesive capsulitis.

- To determine the effectiveness of ultrasound with posterior glide mobilization technique to increase the shoulder external rotation range of motion in the patients with adhesive capsulitis.

- To determine the effectiveness of ultrasound with anterior glide Vs posterior glide joint mobilization technique to increase the shoulder external rotation range of motion in the patients with adhesive capsulitis.

HYPOTHESIS

NULL HYPOTHESIS

The null hypothesis states that there was no significant difference between ultrasound with anterior glide and ultrasound with posterior glide mobilization technique to increase the shoulder external rotation range of motion in the patients with adhesive capsulitis.

ALTERNATE HYPOTHESIS

The alternate hypothesis states that there was significant difference between ultrasound with anterior glide and ultrasound with posterior glide mobilization technique to increase the shoulder external rotation range of motion in the patients with adhesive capsulitis.

REVIEW OF LITERATURE

Andrea J. Johnson (2007)

Conducted an experimental study on 20 subjects aged from 40 to 60 years. The purpose of the study was to compare the efficacy of ultrasound with anterior Vs posterior glide mobilization technique for improving shoulder external rotation range of motion (ROM) in patients with the adhesive capsulitis. Hence, the result of this study showed that ultrasound with posterior glide mobilization technique was more effective than an anterior glide mobilization technique.

Levyo et. al., (2000)

Conducted an experimental study on 49 patients with adhesive capsulitis. All patients were treated for a period of about 4 to 8 weeks. The purpose of the study was to modify the course of disease and to shorten recovery time by combining intensive physiotherapy with intra articular infiltration and gentle manipulation. The result of this study shows that there are about 90% of patients improved dramatically with the initial physiotherapy regimen.

Griggs SM et. al., (2000)

Conducted an experimental study on 75 subjects with idiopathic adhesive capsulitis. The purpose of the study was to find out the

effectiveness of shoulder joint stretching exercises to improve the shoulder range of motion. They establish the four directional shoulder stretching exercise program for pain and range of motion. The result of this study shows that there are about 90% of patient who were successfully treated with four directional shoulder stretching exercise program has good improvement in range of motion.

Ar-Tyan HSU et. al., (2001)

Conducted an experimental study for 14 subjects, aged between 60 to 91 years with adhesive capsulitis. The purpose of the study was to check the efficacy of simulated dorsal and the ventral translational mobilization (DTM & VTM) of the glenohumeral joint on the abduction and rotational movements. Each patient underwent 5 repetitions of DTM and VTM in the plane of scapula abduction and rotation were measured as the main outcome parameters before and after each mobilization technique. The result of this study indicate that both DTM and VTM procedures at the end range of abduction increased glenohumeral abduction range of motion.

Maricar N et. al., (2006)

Conducted an experimental study on 30 patients with stage three adhesive capsulitis. The aim of the study was to determine the effect of anteroposterior mobilization in shoulder flexion and longitudinal caudad in shoulder abduction. The shoulder pain and disability index was used to monitor pain and functional disability and shoulder movements were

measured. The deterioration in shoulder motion, pain and function observed suggest the beneficial effect of an earlier physiotherapy intervention.

Jing-Lan Yang (2006)

Conducted an experimental study for 28 subjects with frozen shoulder syndrome. The purpose of this research was to compare the application of 3 mobilisation techniques. The session of each treatment was 2 weeks, for a total of 12 weeks. Outcome measures were the functional score and shoulder kinematics. The result of this study showed that end range mobilization (ERM) and mobilization with movement (MWM) are more effective than mid range mobilization (MRM) in increasing mobility and functional ability.

Doqry H et. al., (2008)

Conducted an experimental study on 49 patients with adhesive capsulitis over a period of 2 weeks. The purpose of the study was to assess the effectiveness of therapeutic ultrasound in the treatment of adhesive capsulitis. Shoulder range of motion, pain, and shoulder pain and disability index were measured at the beginning and after to the treatment program. The result of this study suggests that ultrasound gives benefit in the management of adhesive capsulitis.

Tveita EK et. al.,

Conducted an experimental study on 191 patients with adhesive capsulitis. The purpose of this study was to find out the factor structure of the SPADI in a study population. The questionnaire was administered to patients with adhesive capsulitis. The result of this study impressed that the SPADI should be as essentially unidimentional in patients with adhesive capsulitis.

Boone DC et. al.,

Conducted a case study on normal male subjects to determine the variability and reliability of goniometric measurements. The subjects were rated once weekly for four weeks by the testers with differed experience in goniometry. Data were analyzed by the analysis of variance with the repetitive measures. The result shows the reliability of goniometric measurement by increased joint range of motion.

Hernicus M Vermeulen et. al.,

Conducted an experimental study on 10 subjects aged from 41-65 years with adhesive capsulitis. The purpose of this study was to find out the effectiveness of high grade and low grade joint mobilization to improve the ROM. They established the effect in increasing the range of motion by high grade – low grade joint mobilization at end range. The result shows that high grade mobilization is beneficial for increasing glenohumeral joint mobility and reducing disability.

MATERIALS AND METHODOLOGY

MATERIALS

- Goniometer.
- Shoulder pain and disability index chart.
- Couch.
- Pillows.
- Inch tape.

METHODOLOGY

Study Design

Quasi experimental study with pre Vs post design.

Study Setting

The study was conducted in out patient department of J.K.K Munirajah Medical Research Foundation College of Physiotherapy, Komarapalayam under the supervision of concerned authority.

Study Sampling

A total number of 30 patients who were diagnosed as adhesive capsulitis by clinical orthopaedician were selected by random sampling method and divided into 2 groups after due consideration to the inclusion and exclusion criteria.

Study Duration

One month (3 sessions per week).

Inclusion Criteria

- Patients with 4-5 months duration of adhesive capsulitis.
- Idiopathic adhesive capsulitis (insidious onset).
- Sex-both sexes.
- Age group-30 to 50 years.
- Pain with restricted range of motion not more than 50%.
- Unilateral condition.
- Restricted range of motion due to capsular lesion.

Exclusion Criteria

- Polyarthritis.
- Hemiplegic shoulder.
- Cardiovascular disease.
- Osteoporosis.
- Cervical spondylosis.
- Hypertension.
- Brachial neuralgia.
- Neurological disorder (like Stroke, Parkinsonism).
- Subscapularis flexibility deficits.
- Fractured/ Dislocated shoulder.
- Severe shoulder deformity.

Parameters

1. Shoulder pain and disability index

The shoulder pain and disability index (SPADI) is the self report questionnaire developed to evaluate the pain and disability associated with shoulder pathology. It includes 13 items in two different subscales; pain (5 items) and disability (8 items); initially items were presented in a visual analogue format.

2. Range of Motion

Goniometer is the instrument used for measuring the range of motion in body joints. Goniometer is constructed by a metal or plastic. The design includes body and two thin extensions called arm. Body resembles a protractor and may form a full or half circle measurement scales are located on one or both sides of the body. The scales on full circle instrument extended either from 0°- 180°. The scales on half-circle instrument extended from 180°-0°. The intervals on the scale may vary from 1°-10°. The moving arm is attached to the fulcrum in the centre of the body of the goniometer by a screw like device that permits the arm to move freely on the body. The length of the arm varies among instrument from approximately 1-16 inches.

Procedure

A total number of 30 subjects who met the inclusion criteria were recruited by convenient sampling method. After the informed consent obtained they were divided into 2 groups- group A and group B with 15 subjects in each group.

After a brief demonstration about the procedures, Group A subjects were subjected to Ultrasound with Anterior Glide for a period of 4 weeks.

After a brief demonstration about the procedures, Group B subjects were subjected to Ultrasound with Posterior Glide for a period of 4 weeks.

Pre test and Post test results were recorded and computed.

Statistical Tool

The statistical tools used in the study were paired ‘t’ test and unpaired ‘t’ test.

Paired ‘t’ test:

The paired ‘t’ test was used to find out the statistical significance between pre and post test of patients treated with Ultrasound with Anterior glide Vs Ultrasound with Posterior glide separately.

Formula: Paired ‘t’ test:

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between pre test Vs post test values

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation.

Unpaired ‘t’ test:

The unpaired ‘t’ test was used to compare the statistically significant difference between Group A and Group B.

Formula: Unpaired ‘t’ test:

$$s = \sqrt{\frac{(n_1 - 1)s_1^{\,2} + (n_2 - 1)s_2^{\,2}}{n_1 + n_2 - 2}}$$

$$t = \frac{\left|\bar{x}_1 - \bar{x}_2\right|}{s\sqrt{{}^1/_{n_1} + {}^1/_{n_2}}}$$

n_1 = total number of subjects in group A

n_2 = total number of subjects in group B

x_1 = difference between pre test Vs post test of group A

$\bar{x}_1$ = mean difference between pre test Vs post test of group A

x_2 = difference between pretest Vs post test of group B

$\bar{x}_2$ = mean difference between pre test Vs post test of group B

s = standard deviation.

DATA PRESENTATION

TABLE - I

S.No	Group A Ultrasound with anterior glide				Group B Ultrasound with posterior glide			
	SPADI		Shoulder External Rotation ROM		SPADI		Shoulder External Rotation ROM	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1.	70	61	29	60	70	55	25	38
2.	65	54	22	45	63	50	28	42
3.	68	53	28	59	65	55	33	50
4.	58	45	25	75	58	43	27	50
5.	63	52	33	62	62	50	28	45
6.	60	47	27	58	60	42	35	50
7.	67	58	25	50	66	52	25	39
8.	57	48	30	62	57	42	29	40
9.	72	60	31	65	72	58	33	48
10.	75	60	30	65	75	60	22	35
11.	69	53	24	60	69	51	27	42
12.	68	52	28	45	66	50	26	46
13.	70	57	25	49	70	52	30	45
14.	67	56	32	56	68	52	32	50
15.	66	50	36	52	69	50	33	49

- **SPADI –** Shoulder Pain And Disability Index
- **ROM -** Range of Motion

DATA ANALYSIS AND INTERPRETATION

This section deals with the analysis and interpretation of data collected from group A and Group B who underwent ultrasound with anterior and posterior glide respectively.

TABLE – II

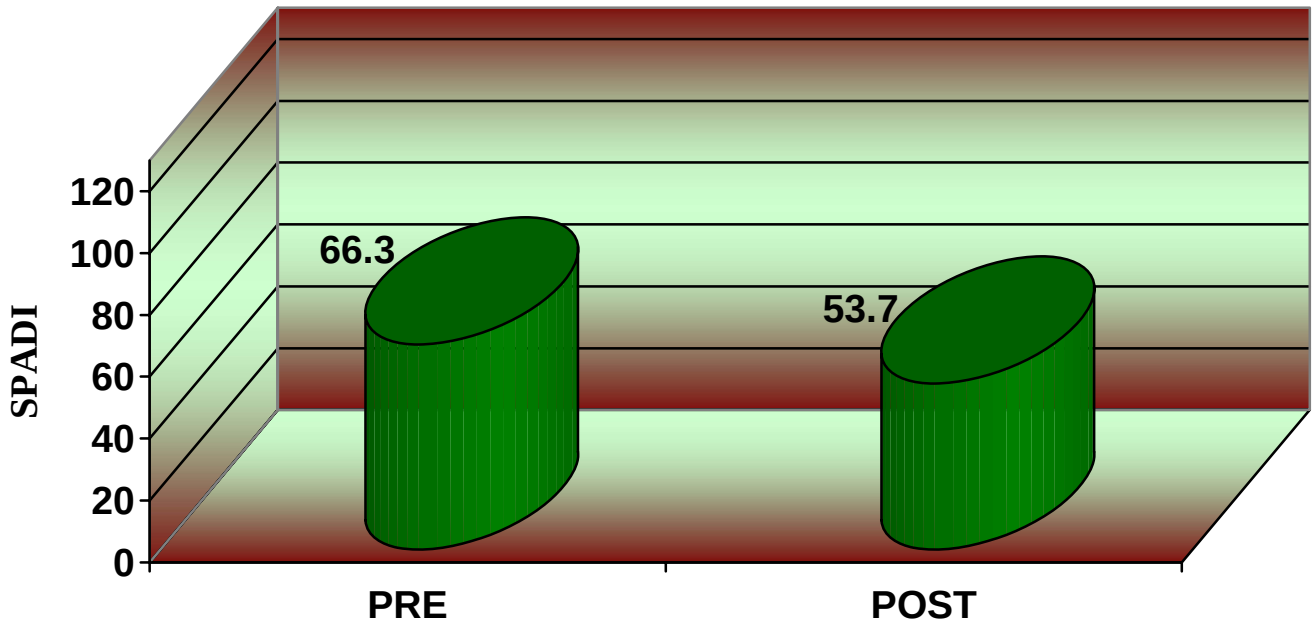
Group – A

Table II represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of SPADI for pain of group A who have been subjected to ultrasound with anterior glide.

SPADI	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	66.3	12.6	2.5	19.5
Post test	53.7			

It shows the analysis of shoulder pain and disability index; the paired 't' value of pre Vs post sessions of group A was 19.5 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 66.3, the post test mean was53.7 and mean difference was 12.6, which showed that there was a decrease in SPADI score after intervention in post test indicating the recovery of selected samples in response to intervention.

Graph I – Shoulder Pain & Disability Index of Group A



Pre & Post test values

TABLE - III

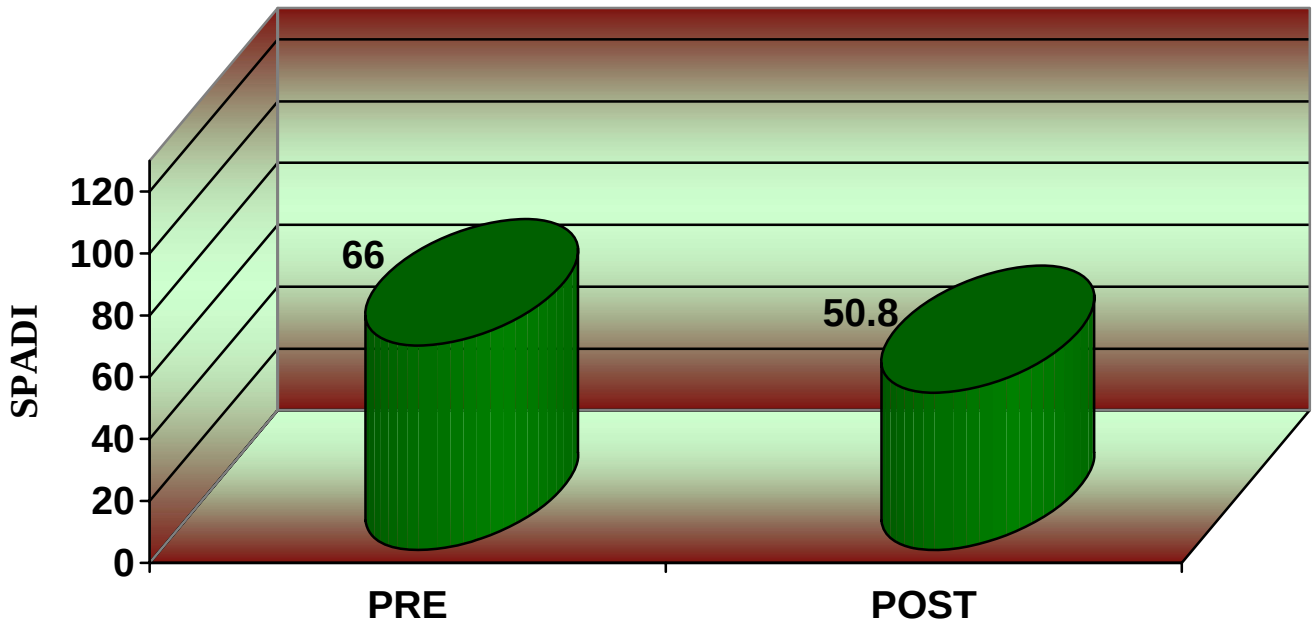
Group – B

Table III represents the mean values, mean difference, standard deviation, and paired ‘t’ value of SPADI score for pain of group B, who have been subjected to ultrasound with posterior glide.

SPADI	Mean	Mean difference	Standard deviation	Paired ‘t’ value
Pre test	66	15.2	2.4	24.18
Post test	50.8			

Table III shows the analysis of shoulder pain and disability index; the paired ‘t’ value of pre Vs post sessions of group B was 24.18 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was66, the post test mean was 50.8 and mean difference was 15.2, which showed that there was a decrease in SPADI score in post test indicating the recovery of selected samples in response to intervention

Graph II – Shoulder Pain & Disability Index of Group B



Pre & Post test value

TABLE – IV

Table IV represents the comparative mean values, mean difference, standard deviation, and unpaired ‘t’ value between group A and group B on sholder pain and disability index Evaluation.

SPADI	Mean	Mean difference	Standard deviation	Unpaired ‘t’ value
Group A	12.6	2.6	2.4	3
Group B	15.2			

Table IV shows the analysis of group A and group B with shoulder pain and disability index Evaluation. The unpaired ‘t’ value of 3 was greater than the tabulated ‘t’ value of 2.05 at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was 12.6 and the mean value of group B was 15.2, which showed that there was a greater improvement in group B than group A.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

Graph III - Mean difference of Group A and Group B – SPADI

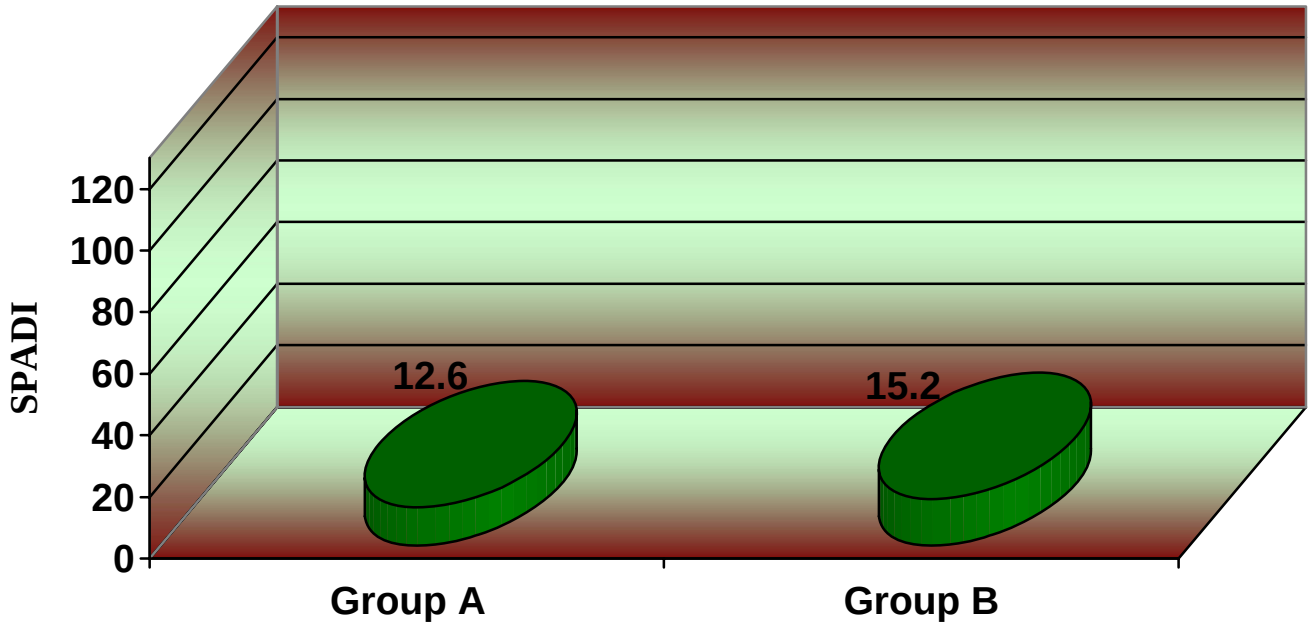


TABLE - V

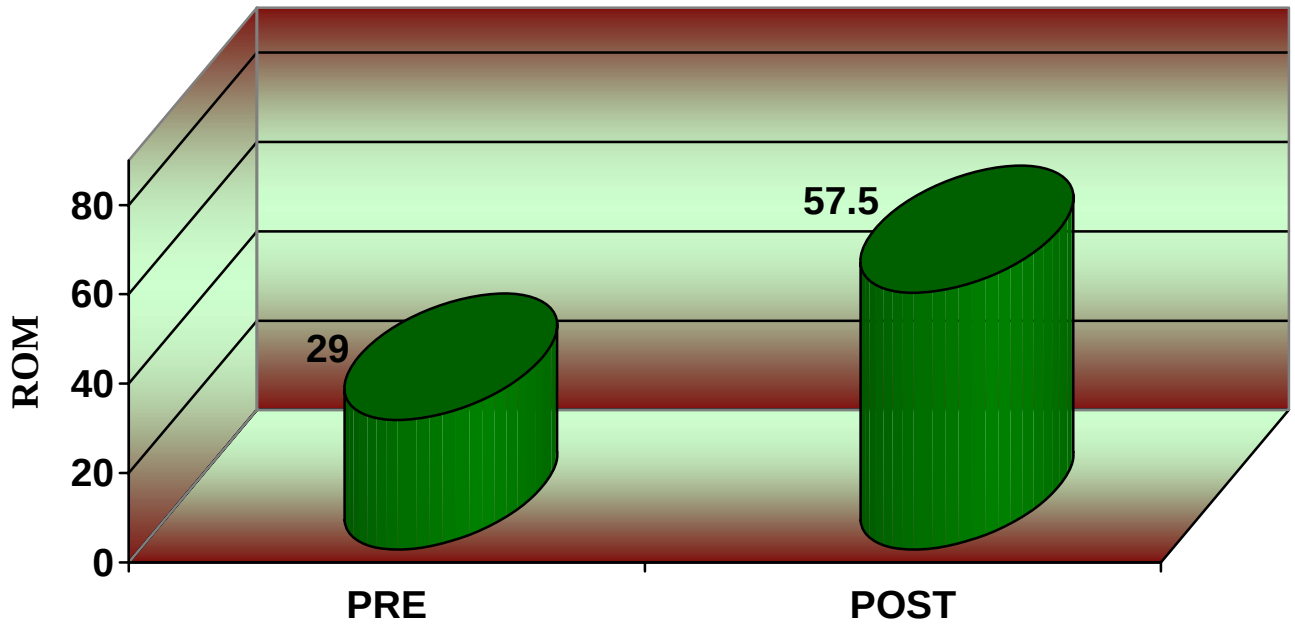
Group – A

Table V represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of shoulder external rotation ROM of group A who have been subjected to ultrasound with anterior glide.

Shoulder external rotation ROM	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	29	28.5	6.9	16
Post test	57.5			

Table V shows the analysis of shoulder external rotation ROM; the paired 't' value of pre Vs post sessions of group A was 16 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 29, the post test mean was 57.5 and mean difference was 28.5, which showed that there was an increase in shoulder external rotation ROM in post test indicating the recovery of selected samples in response to intervention

Graph IV– Range of Motion of Group A



Pre & Post test values

TABLE - VI

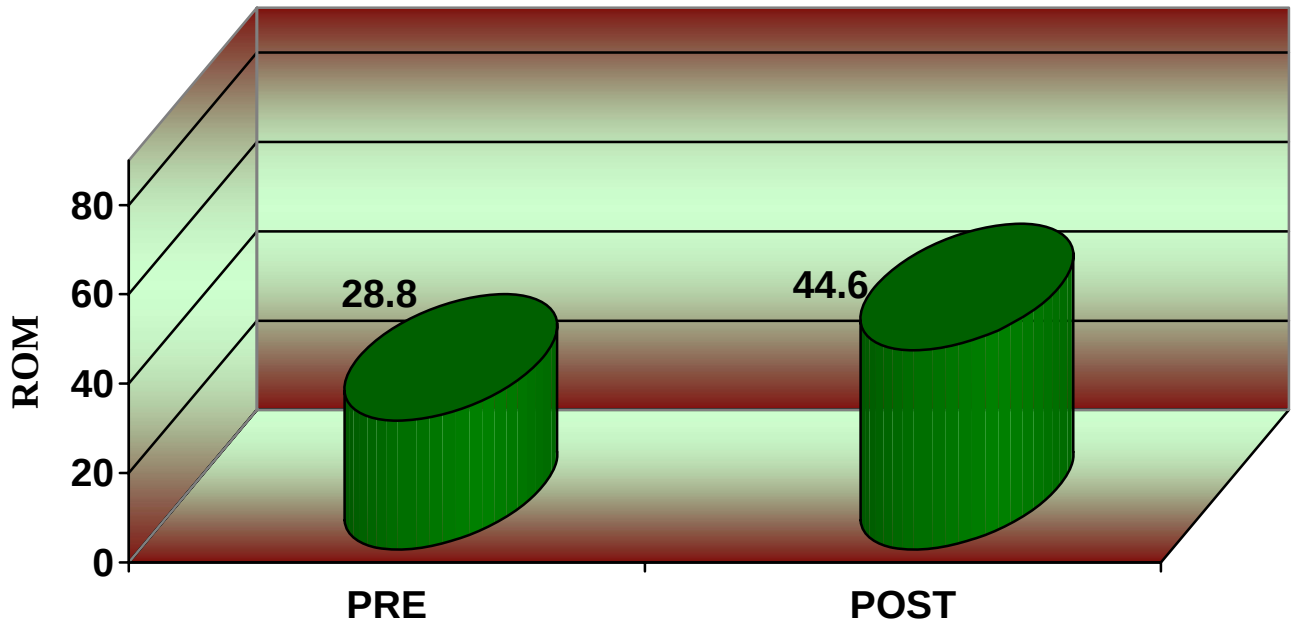
Group – B

Table VI represents the mean values, mean difference, standard deviation, and paired ‘t’ value of shoulder External rotation ROM for group B, who have been subjected to ultrasound with posterior glide.

Shoulder external rotation ROM	Mean	Mean difference	Standard deviation	Paired ‘t’ value
Pre test	28.8	15.8	2.9	20.9
Post test	44.6			

Table VI shows the analysis of shoulder external rotation ROM; the paired ‘t’ value of pre Vs post sessions of group B was 20.9 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 28.8, the post test mean was 44.6 and mean difference was 15.8, which showed that there was an increase in shoulder external rotation ROM in post test indicating the recovery of selected samples in response to intervention.

Graph V– Range of motion of Group B



Pre & Post test values

TABLE - VII

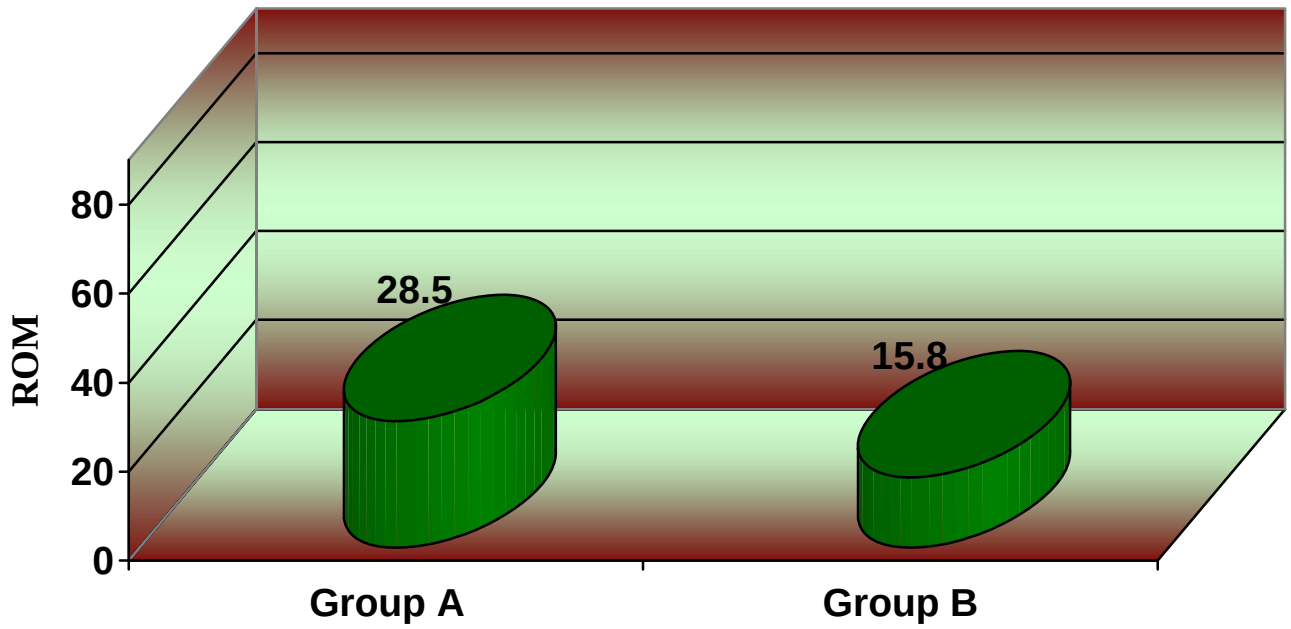
Table VII represents the comparative mean values, mean difference, standard deviation, and unpaired ‘t’ value between group A and group B on shoulder external rotation ROM .

Shoulder external rotation ROM	**Mean**	**Mean difference**	**Standard deviation**	**Unpaired ‘t’ value**
Group A	28.5	12.7	2.9	12
Group B	15.8			

Table VII shows the analysis of group A and group B with Pain free Grip Strength. The unpaired ‘t’ value of 12 was greater than the tabulated ‘t’ value of 2.05 at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was 28.5 and the mean value of group B was 15.8, which showed that there was a greater improvement in group B than group A.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

Graph VI - Mean difference of Group A and Group B – Range of Motion



DISCUSSION

The aim of this study was to compare the effect of anterior glide Vs posterior glide joint mobilization on external rotation range of motion in patients with adhesive capsulitis.

Tveita EK et. al., conducted an experimental study on 191 patients with adhesive capsulitis. . The outcome was measured by shoulder pain and disability index questionnaire.

Maricar N et. al., conducted an experimental study on 30 patients with adhesive capsulitis. They used shoulder pain and disability index to measure the outcome.

Boone DC et. al., Conducted a pilot study on 30 subjects to determine the variability and reliability of goniometric measurements.

Based on the results of above studies, it is concluded that SPADI and range of motion could be used to quantify the pain and functional status in adhesive capsulitis.

In the analysis and interpretation of SPADI in group A:

The paired ‘t’ value of 19.5 was greater than the tabulated paired ‘t’ value of 2.15, which showed that there was statistically significant difference at 0.05 level of significance and 14 degrees of freedom between pre and post results. The pre test mean was 66.3, post test mean was 53.7 and mean difference was 12.6, which showed improvements regarding pain

and functional status in response to ultrasound with anterior glide for 4 weeks.

In the analysis and interpretation of Range of motion in group A:

The paired ‘t’ value of 16 was greater than the tabulated paired ‘t’ value of 2.15, which showed that there was statistically significant difference at 0.05 level of significance and 14 degrees of freedom between pre and post results. The pre test mean was 29, post test mean was 57.5 and mean difference was 28.5, which showed improvements regarding range of motion in response to ultrasound with anterior glide for 4 weeks.

Ludewig and Cook evaluated the effects of anterior glide mobilization in 30 patients with adhesive capsulitis and significant improvements in many aspects of shoulder functional status were observed.

Doqry H et. al., evaluated the effects of ultrasound in 49 patients with adhesive capsulitis and showed significant improvement.

The above study results favor the result of this present study in which ultrasound with anterior glide has got improvement in above mentioned parameters in group A patients with adhesive capsulitis.

In the analysis and interpretation of SPADI in group B:

The paired ‘t’ value of 24.18 was greater than the tabulated paired ‘t’ value of 2.15, which showed that there was statistically significant

difference at 0.05 level of significance and 14 degrees of freedom between pre and post results. The pre test mean was 66, post test mean was 50.8 and mean difference was 15.2, which showed improvements regarding pain and functional status in response to ultrasound with posterior glide for 4 weeks.

In the analysis and interpretation of range of motion in group B:

The paired ‘t’ value of 20.9 was greater than the tabulated paired ‘t’ value of 2.15, which showed that there was statistically significant difference at 0.05 level of significance and 14 degrees of freedom between pre and post results. The pre test mean was 28.8, post test mean was 44.6 and mean difference was 15.8, which showed improvements regarding range of motion in response to ultrasound with posterior glide for 4 weeks.

Andrea J Johnson advocated a randomized controlled trial on 40 patients with adhesive capsulitis. The experimental group received ultrasound with posterior glide. The results of the study demonstrated that posterior glide showed significant improvement in external rotation than anterior glide.

The study results of Andrea J Johnson et. al., supports the result of present study in which ultrasound with posterior glide has got improvement in above mentioned parameters in group B patients with adhesive capsulitis.

IN THE COMPARISON OF GROUP – A AND GROUP – B:

In the analysis and interpretation of SPADI between group A and group B:

In the analysis and interpretation of SPADI, the unpaired 't' value of 3 was greater than the tabulated 't' value of 2.05, at 0.05 level of significance and 28 degrees of freedom, which showed that there was statistically significant difference between pre test Vs post test results of group A and group B. The mean value of group A was 12.6, mean value of group B was 15.2 and mean difference was 2.6 which showed that there was significant improvements regarding pain and functional status in group B compared to group A in response to treatment.

In the analysis and interpretation of range of motion between group A and group B:

In the analysis and interpretation of range of motion, the unpaired 't' value of 12 was greater than the tabulated 't' value of 2.05, at 0.05 level of significance and 28 degrees of freedom, which showed that there was statistically significant difference between pre test Vs post test results of group A and group B. The mean value of group A was 28.5, mean value of group B was 15.8 and mean difference was 12.7 which showed that there was significant improvements regarding range of motion in group B compared to group A in response to treatment.

Based on the statistical analysis and interpretation of the results, the present study showed that there was significant improvement regarding pain,

functional status and range of motion based on decrease in SPADI and increase in range of motion values in patients with adhesive capsulitis treated with ultrasound and posterior glide technique.

Therefore, the present study is accepting alternate hypothesis and rejecting null hypothesis.

Reason for Improvement

Glide mobilization

Mechanism for pain reduction:

Distraction causes synovial fluid movement which brings nutrition to the avascular cartilage of the joint surface and improves the nutrient exchange and thus prevent the painful and degeneration effect of stasis.

Neutralizes pressure in joint surfaces and pain relief by reducing compressive forces.

Accessory movement normally stimulate the large diameter fibre conducting Proprioceptive input to the spinal cord which acts as the pain gate which blocks the transmission of slow conducting small diameter pain fibers. It inhibits the ongoing nociceptive input to anterior horn cell and central nervous system.

Separate articulating surfaces, taking up slack or eliminating play within joint capsule.

Mechanism of increase in range of motion:

Stretching of soft tissue surrounding joint and increase mobility in hypo mobile joint.

Due to stretch placed on the visco-elastic structures in and around the shoulder joint, there is an increase in length of capsular fibers due to rearrangement of collagen tissues with a reduction of cross link formation and development of parallel fibers configuration in the collagen tissue and also due to break in intra capsular fibro fatty adhesion (Edmond). This enables the improvement in range of movement.

Posterior glide

During the sustained pressure of the posterior glide mobilization procedure, a sudden “giving way”, along with an audible “pop”, occurred. They were painless and accompanied with an immediate increase in the external rotation ROM,. This does not happen with any anterior glide mobilization.

Ultrasound

Increases calcium ion diffusion across the cell membrane, thereby increasing the release of wound healing factors.

It promotes collagen synthesis (Harvey, et.al) and enhances healing.

It encourages the growth of new capillaries and increases the local circulation (Dyson, 1987) to remove pain producing substances.

SUMMARY AND CONCLUSION

SUMMARY

The aim of this study was to compare the effectiveness of ultrasound with anterior glide versus posterior glide in adhesive capsulitis.

A total number of 30 subjects with adhesive capsulitis were selected by convenient sampling method after considering the inclusion and exclusion criteria. The informed consents were obtained from subjects individually.

Shoulder pain and disability index and range of motion were taken as the parameters. Pre test data were collected for group A and group B patients and computed.

Group A patients were subjected to ultrasound with anterior glide and Group B patients were subjected to ultrasound with posterior glide for a period of 4 weeks. The results of the same parameters were recorded for comparison after four weeks of treatment.

Then paired “t” test was used to compare the pre versus post test results of Group A and Group B separately. The unpaired “t” test was used to compare the mean difference of Group A and Group B.

In the analysis and interpretation of SPADI between Group A and Group B, the unpaired “t” value of 3 was greater than the tabulated “t” value of 2.05 which showed that there was statistically significant difference at 0.05 level between mean difference of Group A & Group B. The mean

value of Group B was which was 15.2 which was greater than the Group A value of 12.6, shows that there was a significant decrease in pain and improvement in function in Group B compared to Group A in response to intervention.

In the analysis and interpretation of Range of motion between Group A and Group B, the unpaired “t” value of 12 was greater than the tabulated “t” value of 2.05 which showed that there was statistically significant difference at 0.05 level between mean difference of Group A & Group B. The mean value of Group B was which was 15.8 which was smaller than the Group A value of 28.5, shows that there was a significant improvement in external rotation Range of motion in Group B compared to Group A in response to intervention.

CONCLUSION

Based on statistical analysis, the results of this study showed that there was significant improvement in both groups. The results also showed that the subjects who participated in experimental Group B had shown good improvement on pain and external rotation range of motion than the control Group A.

Based on the results, this study concluded that both anterior glide and posterior glide with ultrasound reduce the pain and improve the external rotation range of motion in adhesive capsulitis. Meanwhile, ultrasound with posterior glide is more effective than the ultrasound with anterior glide in reducing the pain and improving the external rotation range of motion in adhesive capsulitis.

RECOMMENDATIONS

- Further study can be conducted to compare the mulligan and Maitland approaches in the treatment of adhesive capsulitis.

- Similar studies with large samples can be conducted

- Similar studies can be conducted with other pain questionnaires and functional activities.

- Similar study can be conducted to find out the effect of mobilization with shoulder exercises for patients with adhesive capsulitis.

- Further study can be conducted to compare the effect of mobilization with capsular stretching

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APPENDIX

DEFINITION OF TERMS

Adhesive Capsulitis:

Adhesive capsulitis is characterized by an insidious and progressive loss of active and passive mobility in the glenohumeral joint presumably due to capsular contracture.

Mobilization:

Mobilizations are passive movements performed by therapist with certain amplitude under the control of patient for treating the musculoskeletal dysfunction.

Ultrasound:

Ultrasound is a form of acoustic vibration propagated in the form of longitudinal compression waves at frequencies too high to be heard by the human ear.

SPADI:

The Shoulder Pain and Disability index is a self report questionnaire framed to measure the pain and disability accompanied with shoulder pathology.

Goniometer:

Goniometer is the instrument used for measuring the range of motion in body joints. The scales on full circle instrument extended either from 0^0 - 180^0. The scales on half circle instrument extended from 180^0-0^0.

PARAMETER

SHOULDER PAIN AND DISABILITY INDEX (SPADI)

Place a mark on the line that best represents your experience during the last week attributable to your shoulder problem.

PAIN SCALE

How severe is your pain?

Circle the number that best describes your pain where: 0= no pain and 10= the worst pain imaginable.

At its worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something on a high shelf	0	1	2	3	4	5	6	7	8	9	10
Teaching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

DISABILITY SCALE

How much difficulty do you have?

Circle the number that best describes your pain where: 0= no difficulty and 10=so difficult it requires help.

Washing your hair?	0	1	2	3	4	5	6	7	8	9	10
Washing your back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an undershirt or jumper?	0	1	2	3	4	5	6	7	8	9	10
Putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
Putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy object of 4.5 Kg	0	1	2	3	4	5	6	7	8	9	10
Removing something from your back pocket?	0	1	2	3	4	5	6	7	8	9	10

Interpretation of Scores

Total Pain Score : /50 * 100 =

Total Disability Score : /80 * 100 =

Total SPADI Score : /130 * 100 =

RANGE OF MOTION

Goniometer was used to measure the range of motion of shoulder.

SHOULDER EXTERNAL ROTATION:

Patient position:

- Supine lying - arm abducted to 90^0 and elbow flexed to 90^0 forearm pronated and perpendicular to floor.

Measurement:

- Axis - olecranon process of humerus.
- Stationary arm - perpendicular to floor.
- Movable arm - parallel to midline of forearm.

TECHNIQUE

ULTRASOUND TECHNIQUE

Chair sitting and the arm was supported on a pillow with the elbow slightly flexed and pronated.

Method:

- Ensure that the intensity was at zero.

- Turn the knob to continuous mode.
- Apply ultrasonic gel over the treatment head and place it over the treatment area.
- By rotating the treatment head with one hand, adjust the intensity knob till it reaches 1.5 W/cm^2, for duration of 7 minutes.

Picture I - Ultrasound Treatment

For anterior capsule

For posterior capsule

ANTERIOR GLIDE

Patient position:

Supine lying

Therapist position:

The therapist stands at the patient's head facing the glenohumeral joint.

Procedure:

At the end range of abduction and external rotation, a lateral humeral distraction in its midrange position is maintained while the anterior stretch mobilization was performed to end range.

Picture II - Anterior Glide Technique

POSTERIOR GLIDE

Patient position:

Supine lying

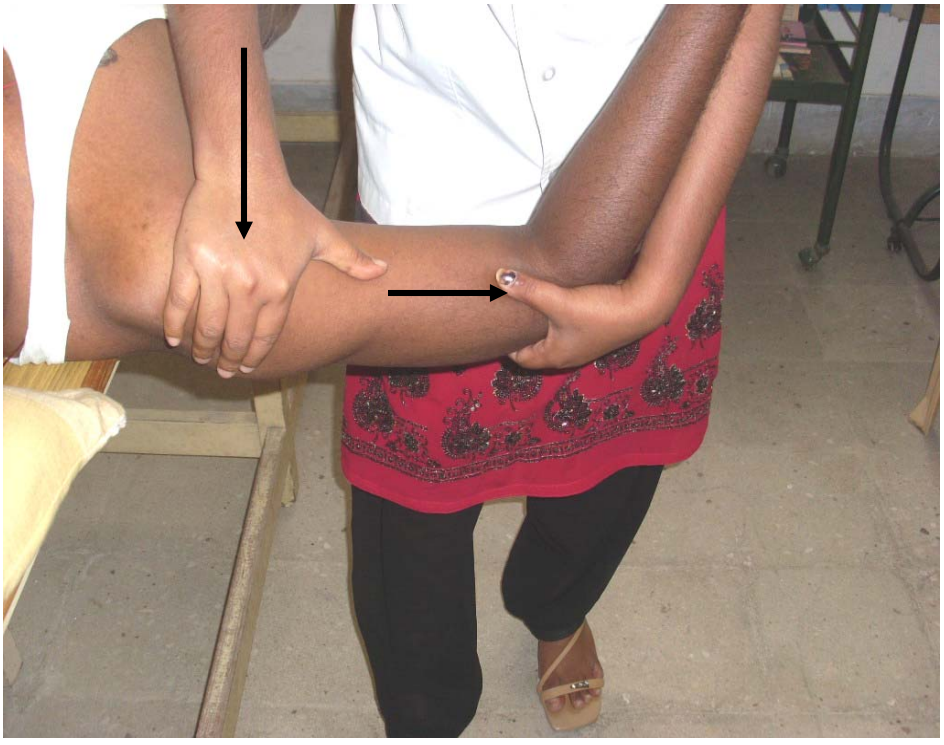
Therapist position:

The therapist stands at the patient's head facing the glenohumeral joint.

Procedure:

At the end range of abduction and external rotation, a lateral humeral distraction in its midrange position is maintained while the posterior stretch mobilization was performed to end range.

Picture III - Posterior Glide Technique



INFORMED CONSENT

Name :

Age :

Sex :

Occupation :

Address for communication :

Declaration,

I have fully understood the nature and purpose of the study. I accept to be a subject in this study. I declare that the above information is true to my knowledge.

Signature of the subject Signature of the researcher

ASSESSMENT CHART

Name :

Age :

Sex :

Occupation :

Chief complaints :

Present medical history :

Past medical history :

On observation :

On palpation :

On examination :

Range of motion

End feel

Diagnosis :

Adhesive Capsulitis

Treatment **:**

Ultrasound with Anterior Glide /

Posterior Glide Mobilization

Prognosis chart **:**

Parameter	Before Treatment	After Treatment
SPADI		
Range of Motion		